Appl. No. 10/075,406 Amdt. dated December 22, 2003 Reply to Office action of October 21, 2003

An appendix after page 16 includes a complete set for formal drawings.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Canceled):

1

2

3

4

5

6

7

8

9

10

11

12

13

1

2

3

4

5

Claim 2.	(Currently Amended):	The substrate according to claim 1A	substrate for
an area array p	ackage.	•	

said substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

said substrate having a ground structure including, for each signal wiring, a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring, and

said substrate having a plurality of ground via holes through the substrate, including at least one respective ground via hole through each rectangular ground plane portion,

wherein each ground plane portion has a plurality of ground via holes therethrough.

Claim 3. (Currently Amended): The substrate according to claim 1 A substrate for an area array package.

said substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

17795 (Tyco 6)

Appl. No. 10/075,406 Amdt. dated December 22, 2003 Reply to Office action of October 21, 2003

11

portion.,

6	said substrate having a ground structure including, for each signal wiring, a pair
7	of rectangular ground plane portions located on opposite sides of the second contact of
8	that signal wiring, and
9	said substrate having a plurality of ground via holes through the substrate,
10	including at least one respective ground via hole through each rectangular ground plane
11	portion,
12	wherein for each second contact, the respective ground plane portions are
13	connected by a third ground plane portion on a third side of the second contact.
1	Claim 4. (original): The substrate according to claim 3, wherein the third ground
2	plane portion has a plurality of ground via holes therethrough.
1	Claim 5. (original): The substrate according to claim 3, wherein the third ground
2	plane portions of each second contact on at least a side of the substrate are continuously
3	connected.
1	Claim 6. (Currently amended): The substrate according to claim 1 A substrate for
2	an area array package,
3	said substrate having a plurality of signal wirings, each having a first contact
4	adapted to be connected to a respective terminal of an integrated circuit, and a second
5	contact on a periphery of the substrate,
6	said substrate having a ground structure including, for each signal wiring, a pair
7	of rectangular ground plane portions located on opposite sides of the second contact of
8	that signal wiring, and
9	said substrate having a plurality of ground via holes through the substrate,
10	including at least one respective ground via hole through each rectangular ground plane

17795 (Tyco 6)

Appl. No. 10/075,406 Amdt. dated December 22, 2003 Reply to Office action of October 21, 2003

12	wherein each pair of adjacent ones of the second contacts have a single
13	rectangular ground plane portion therebetween.
1	Claim 7. (Currently Amended): The substrate according to claim 1 A substrate for
2	an area array package,
3	said substrate having a plurality of signal wirings, each having a first contact
4	adapted to be connected to a respective terminal of an integrated circuit, and a second
5	contact on a periphery of the substrate,
6	said substrate having a ground structure including, for each signal wiring, a pair
7	of rectangular ground plane portions located on opposite sides of the second contact of
8	that signal wiring, and
9	said substrate having a plurality of ground via holes through the substrate,
10	including at least one respective ground via hole through each rectangular ground plane
11	portion.,
12	wherein the substrate has an opening therethrough sized and shaped to receive the
13	integrated circuit.

Claim 8 (Canceled):

1	Claim 9.	(Currently amended): The package of claim 8_, further comprising An area
2	array packa	ge comprising:
3	<u>a su</u>	bstrate having:
4		a plurality of signal wirings, each having a first contact adapted to
5		be connected to a respective terminal of an integrated circuit, and a second
6		contact on a periphery of the substrate,
7		a ground structure including, for each signal wiring, a pair of
8		rectangular ground plane portions located on opposite sides of the second
9		contact of that signal wiring, and

17795 (Tyco 6)

10		a plurality of ground vias through the substrate, including at least
11		one respective ground via hole through each rectangular ground plane
12		portion;
13	a cov	er above the substrate,
14	<u>a bott</u>	om layer of the package formed of a dielectric material; and
15	an int	ermediate dielectric layer between the bottom layer and the substrate, the
16	intermediate	dielectric layer having an additional ground structure thereon.
1	Claim 10.	(original): The package of claim 9, further comprising a third ground
2	structure bety	ween the bottom layer and the intermediate layer.
1	Claim 11	(original): The package of claim 9, wherein the additional ground structure
1	Claim 11.	
2	_	opening around a signal via that is coupled to the second contact, the ground
3	opening bein	g generally shaped like a rectangle with two mitered corners.
1	Claim 12.	(Currently Amended): The package of claim 8 An area array package
2	comprising:	
3	<u>a sub</u>	strate having:
4		a plurality of signal wirings, each having a first contact adapted to
5		be connected to a respective terminal of an integrated circuit, and a second
6		contact on a periphery of the substrate,
7		a ground structure including, for each signal wiring, a pair of
8		rectangular ground plane portions located on opposite sides of the second
9		contact of that signal wiring, and
10		a plurality of ground vias through the substrate, including at least
11		one respective ground via hole through each rectangular ground plane
12		portion;
13	a cov	er above the substrate, and

17795 (Tyco 6)

14	a bottom layer of the package formed of a dielectric material,
15	wherein the package has a signal via beneath each second contact, and a ground
16	via beneath each ground via hole, each of the signal vias and ground vias being
17	electrically connected to a respective solder attach pad on the bottom layer.
1	Claim 13. (original): The package of claim 12, wherein each signal via is surrounded
2	on three sides.
1	Claim 14. (original): The package of claim 13, wherein each signal via is surrounded
2	by at least seven ground vias.
1	Claim 15. (Currently amended): The package of claim 8, further comprising An area
2	array package comprising:
3	a substrate having:
4	a plurality of signal wirings, each having a first contact adapted to
5	be connected to a respective terminal of an integrated circuit, and a second
6	contact on a periphery of the substrate,
7	a ground structure including, for each signal wiring, a pair of
8	rectangular ground plane portions located on opposite sides of the second
9	contact of that signal wiring, and
10	a plurality of ground vias through the substrate, including at least
11	one respective ground via hole through each rectangular ground plane
12	portion;
13	a cover above the substrate,
14	a bottom layer of the package formed of a dielectric material; and
15	a superstrate above the substrate, the superstrate generally being formed of the
16	some material as the substrate

17795 (Tyco 6)

1	Claim 16.	(original): The package of claim 15, wherein the superstrate has an
2	opening there	ethrough above each second contact.
1	Claim 17.	(original): The package of claim 16, wherein the opening above each
2	second contact	ct is cylindrical and is greater in diameter than the ground vias.
1	Claim 18.	(original): The package of claim 16, wherein the opening above each
2	second conta	ct is filled with a material having a sufficiently low dielectric constant to
3	reduce the ra	diation from a region of the second contact significantly.
1	Claim 19.	(Currently amended): The package of claim 8 An area array package
2	comprising:	
3	<u>a sub</u>	strate having:
4		a plurality of signal wirings, each having a first contact adapted to
5		be connected to a respective terminal of an integrated circuit, and a second
6		contact on a periphery of the substrate,
7		a ground structure including, for each signal wiring, a pair of
8		rectangular ground plane portions located on opposite sides of the second
9		contact of that signal wiring, and
10		a plurality of ground vias through the substrate, including at least
11		one respective ground via hole through each rectangular ground plane
12		portion;
13	a cov	er above the substrate, and
14	<u>a bott</u>	om layer of the package formed of a dielectric material,
15	where	ein the package includes a plurality of pockets, each pocket shaped and sized
16	to accommod	late an integrated circuit.

17795 (Tyco 6)

1	Claim 20.	(Currently Amended): A printed circuit board assembly, comprising:
2	a printe	d circuit board having a circuit board substrate with circuit traces and a
3	plurality of dev	rices thereon, said plurality of devices including at least one integrated
4	circuit package	assembly that includes:
5	a packa	ge substrate having:
6		a plurality of signal wirings, each having a first contact adapted to
7		be connected to a respective terminal of an integrated circuit, and a second
8		contact on a periphery of the package substrate,
9		a ground structure including, for each signal wiring, a pair of
10		rectangular ground plane portions located on opposite sides of the second
11		contact of that signal wiring, each ground plane portion having a plurality
12		of ground via holes therethrough, and
13	l	a plurality of ground vias through the package substrate, including
14		at least one respective the plurality of ground via holes through each
15	1	rectangular ground plane portion;
16	a lid ab	ove the package substrate, and
17	a bottor	n layer of the package formed of a dielectric material, the bottom layer
18	having a plural	ity of solder attach pads, electrically connected to contacts of the circuit
19	board substrate	2.
	Claim 21 (Can	celed):
1	Claim 22: (Cur	rently Amended): The package of claim 21 An area array package
2	comprising:	
3	<u>a substr</u>	rate having a plurality of signal wirings, each having a first contact adapted
4	to be connected	d to a respective terminal of an integrated circuit, and a second contact on a

17795 (Tyco 6)

5	periphery of the substrate, the substrate having a signal via penetrating each second
6	contact;
7	a superstrate formed of a dielectric material above the substrate, the superstrate
8	having a respective opening therethrough above each second contact;
9	a lid above the superstrate; and
10	a bottom layer of the package formed of a dielectric material,
11	wherein the opening above each second contact is cylindrical and is greater in
12	diameter than the ground vias.
1	Claim 23. (Currently Amended): The package of claim 21 An area array package
2	comprising:
3	a substrate having a plurality of signal wirings, each having a first contact adapted
4	to be connected to a respective terminal of an integrated circuit, and a second contact on a
5	periphery of the substrate, the substrate having a signal via penetrating each second
6	contact;
7	a superstrate formed of a dielectric material above the substrate, the superstrate
8	having a respective opening therethrough above each second contact;
9	a lid above the superstrate; and
10	a bottom layer of the package formed of a dielectric material,
11	wherein the superstrate is formed of the same material as the substrate.
1	Claim 24. (Currently Amended): The package of claim 21 An area array package
2	comprising:
3	a substrate having a plurality of signal wirings, each having a first contact adapted
4	to be connected to a respective terminal of an integrated circuit, and a second contact on a
5	periphery of the substrate, the substrate having a signal via penetrating each second
6	contact;

17795 (Tyco 6)

Appl. No. 10/075,406 Amdt. dated December 22, 2003 Reply to Office action of October 21, 2003

I	a superstrate formed of a dielectric material above the substrate, the superstrate
I	having a respective opening therethrough above each second contact;
	a lid above the superstrate; and
	a bottom layer of the package formed of a dielectric material,
	wherein the substrate has a plurality of ground vias therethrough, at least partially
•	surrounding each of the signal vias.

- 1 Claim 25. (original): The package of claim 24, wherein the substrate has a plurality
- 2 of rectangular ground plane portions surrounding each of the signal vias on three sides,
- 3 the ground vias penetrating the ground plane portions.

Claims 26-31 (Canceled):

- 1 32. (New): The assembly of claim 20, wherein for each second contact, the respective
- 2 ground plane portions are connected by a third ground plane portion on a third side of the
- 3 second contact.

7

8

9

10

11

12

- 1 33. (New): The assembly of claim 32, wherein the third ground plane portion has a
- 2 plurality of ground via holes therethrough.
- 1 34. (New): The assembly of claim 32, wherein the third ground plane portions of each
- 2 second contact on at least a side of the substrate are continuously connected.
- 1 35. (New): The assembly of claim 20, wherein each pair of adjacent ones of the
- 2 second contacts have a single rectangular ground plane portion therebetween.
- 1 36. (New): The assembly of claim 20, wherein the package substrate has an opening
- 2 therethrough sized and shaped to receive the integrated circuit.